DOCUMENT RESUME

ED 303 423 SP 030 834

AUTHOR Kuhlman, Jolynn S.; Beitel, Patricia A.
TITLE Interrelationships among Age, Sex, and Depth of Sport Experience on a Complex Motor Task by 4- to 9-Year Old Children.
PUB DATE 10 Jun 88
NOTE 27p.; Paper presented at the Annual Conference of the North American Society for the Psychology of Sport and Physical Activity (Knoxville, TN, June 10, 1988). For related document, see SP 030 835.
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Age Differences; Athletics; Elementary Education; *Experiential Learning; *Perceptual Motor Learning; *Performance Tests; *Sex Differences; Soccer; *Team Sports; Young Children

ABSTRACT

Age, gender, and/or previous experience seem to be related to the performance/learning of new perceptual motor tasks. This study sought to determine the relative interrelationships of age, gender, and the depth of sport experience on initial practice of a complex perceptual motor soccer task for 46 children 4- to 9-years-old who were enrolled in a community center day camp. Depth of sport experience was identified by the amount of time the child had played organized competitive sports. Each performance was evaluated by performance time, movement accuracy, and goal attainment. The test involved moving one's self through a stationary environment while controlling and interacting with a moving soccer ball. It was concluded that age and experience are most important to the quality of performance, and there were no constructs related to consistency for this age group. It is suggested that experience negates gender effects in children for the initial performance of complex perceptual motor tasks. Eleven figures are included. (JD)

**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

ED303423

# INTERRELATIONSHIPS AMONG AGE, SEX, AND DEPTH OF SPORT EXPERIENCE ON A COMPLEX MOTOR TASK BY 4- TO 9-YEAR OLD CHILDREN

Jolynn S. Kuhlman, Ph.D.
Indiana State University
Terre Haute, IN

Patricia A. Beitel, Ed.D.
The University of Tennessee
Knoxville, TN

Refereed Paper Presented at the Annual Conference of the
North American Society for the Psychology of Sport and Physical Activity
as a Poster Presentation

Knoxville, Tennessee

June 10, 1988

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

JS Kuhlman
PA Beitel

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SP 030 834

## ABSTRACT

THEORISTS IDENTIFY AGE, SEX, AND/OR PREVIOUS EXPERIENCE TO BE RELATED TO THE PERFORMANCE/LEARNING OF NEW PERCEPTUAL MOTOR TASKS, BUT SELDOM ARE THE COMPLEX INTERACTIONS OF THESE VARIABLES INVESTIGATED. THE PURPOSE OF THIS STUDY WAS TO DETERMINE THE RELATIVE INTERRELATIONSHIPS OF AGE, SEX, AND DEPTH OF SPORT EXPERIENCE ON INITIAL PRACTICE OF A COMPLEX PERCEPTUAL MOTOR SOCCER TASK FOR 4-9 YEAR OLD CHILDREN. THE SUBJECTS WERE 46 CHILDREN BETWEEN 4 AND 9 YEARS OF AGE WHO WERE ENROLLED IN A COMMUNITY CENTER DAY CAMP. PARENTS AND CHILDREN PROVIDED INFORMATION REGARDING AGE AND DEPTH OF SPORT EXPERIENCE. AGE WAS CALCULATED IN YEARS TO THE NEAREST BIRTHDAY. DEPTH OF SPORT EXPERIENCE WAS IDENTIFIED AS: (A) EXPERIENCED, IF THE CHILD HAD ORGANIZED COMPETITIVE SPORT EXPERIENCE, AND (B) INEXPERIENCED, IF THE CHILD HAD ONLY THE USUAL SCHOOL AND RELATED PLAY EXPERIENCES. EACH CHILD PRACTICED 10 TRIALS (1 TRANSFER TRIAL, AND 3 BLOCKS OF 3 TRIALS) OF A COMPLEX NOVEL SERIAL SOCCER TASK WHICH INVOLVED MOVING ONES SELF THROUGH A STATIONARY ENVIRONMENT WHILE CONTROLLING AND INTERACTING WITH A MOVING SOCCER BALL. THE CHILD WAS ASKED TO COMPLETE THE TASK AS QUICKLY AS POSSIBLE. THREE TYPES OF INFORMATION WERE OBTAINED: (A) PERFORMANCE TIME, THE TIME FROM INITIATION OF THE MOVEMENT BY THE SUBJECT UNTIL THEY CROSSED THE FINISH LINE AS RECORDED ON A PERFORMANCE ANALYZER; (B) GOAL ATTAINMENT, THE NUMBER OF CORRECT RESPONSES OUT OF 17 AS OBTAINED FROM EVALUATING THE VIDEO TAPE OF EACH TRIAL UTILIZING THE GOAL ATTAINMENT FORM WHICH CONCERNED THE MOVEMENT OF THE BALL IN RELATION TO THE FIXED ENVIRONMENT AND THE PERFORMER; AND (C) MOVEMENT ACCURACY, THE NUMBER OF CORRECT RESPONSES OUT OF 17 AS OBTAINED FROM EVALUATING THE VIDEOTAPE OF EACH TRIAL UTILIZING THE FORM WHICH

CONCERNED THE MOVEMENT OF THE PERFORMER. RATER RELIABILITY WAS DETERMINED FOR THE VCR TAPE EVALUATION FOR BOTH GOAL ATTAINMENT AND MOVEMENT AS R = .98. INITIAL PRACTICE WAS EVALUATED BY THE TRANSFER TRIAL AND QUALITY (MEAN) AND CONSISTENCY (S.D.) OF THE FIRST BLOCK FOR EACH SOCCER TASK VARIABLE. THE RESULTS OF THE MULTIVARIATE ANALYSES (MANOVA'S AND MULTIPLE REGRESSIONS) PRODUCED THE FOLLOWING SIGNIFICANT ($p \leq .05$) RESULTS: (A) THERE WAS A SPEED-ACCURACY TRADEOFF IDENTIFIED BY SIGNIFICANT RELATIONSHIPS OF BOTH TRANSFER AND BLOCK 1 GOAL ATTAINMENT AND PERFORMANCE TIME; (B) THERE WAS MODERATE AGE RELATIONSHIP TO TRANSFER TRIAL GOAL ATTAINMENT, MOVEMENT ACCURACY, AND PERFORMANCE TIME; (C) THERE WAS MODERATE RELATIONSHIP OF AGE TO BLOCK 1 PERFORMANCE TIME, BUT NOT TO BLOCK 1 GOAL ATTAINMENT NOR MOVEMENT ACCURACY; AND (D) EXPERIENCE WAS MORE RELATED THAN SEX TO ALL VARIABLES EXCEPT BLOCK 1 MOVEMENT ACCURACY AND CONSISTENCY OF GOAL ATTAINMENT. SIGNIFICANT SEX*EXPERIENCE INTERACTIONS INCLUDED: (A) EXPERIENCED MALES AND FEMALES AND INEXPERIENCED MALES WERE SIMILAR IN MOVEMENT ACCURACY; (B) EXPERIENCED FEMALES AND EXPERIENCED MALES WERE MORE SUCCESSFUL IN GOAL ATTAINMENT THAN INEXPERIENCED FEMALES; AND (C) EXPERIENCED MALES AND FEMALES WERE FASTER THAN INEXPERIENCED MALES FOR THE TRANSFER TRIAL, BUT FOR BLOCK 1 EXPERIENCED MALES AND FEMALES WERE FASTER THAN INEXPERIENCED FEMALES. THE PRIMARY CONTRIBUTIONS OF THE STUDY ARE THAT: (A) AGE AND EXPERIENCE ARE THE MOST IMPORTANT TO THE QUALITY OF PERFORMANCE, AND (B) THERE WERE NO CONSTRUCTS RELATED TO CONSISTENCY FOR THIS AGE GROUP. THUS, EXPERIENCE SUGGESTS A NEGATION OF GENDER EFFECTS IN CHILDREN.

# INTRODUCTION

THEORISTS IDENTIFY AGE, SEX, AND/OR PREVIOUS EXPERIENCE TO BE RELATED TO THE PERFORMANCE/LEARNING OF NEW PERCEPTUAL MOTOR TASKS, BUT SELDOM ARE THE COMPLEX INTERACTIONS OF THESE VARIABLES INVESTIGATED. WHITING (1972) STATES THAT EXPERIENCE WITHIN THE SKILL LEARNING/PERFORMANCE ENVIRONMENT PRODUCES DISCRIMINATION OF THE PERTINENT DETAILS FROM THE REDUNDANT CONSTANT INFORMATION. CONNOLLY (1970) ALLEGES THAT TO ACCOMODATE TO THE ENVIRONMENT WHICH IS FULL OF INFORMATION, THE LEARNER MUST ESTABLISH THE EXISTENT REDUNDANCIES AND ESTABLISH CONTINGENCIES OF EVENTS. IF ONE ACCEPTS THE PREMISES THAT: (A) GROSS MOTOR TASKS VARY IN THE COMPLEXITY OF THE ENVIRONMENTAL DEMANDS, (B) THE COMPLEXITY OF THE TASK AFFECTS THE PREMOTOR PROCESSING, AND (C) THE LEARNER OF THE GROSS MOTOR TASK SEARCHES FOR THE ORGANIZATIONAL PROPERTIES IN THE ENVIRONMENT BASED ON EXPERIENCE, THEN, QUESTIONS ARE RAISED CONCERNING THE RELATIVE IMPORTANCE OF THE INFLUENCE OF AGE, SEX, AND DEPTH OF SPORT EXPERIENCE ON PERFORMANCE OF NEW TASKS.

## PURPOSE

THE PURPOSE OF THIS STUDY WAS TO DETERMINE THE RELATIVE INTERRELATIONSHIPS OF AGE, SEX, AND DEPTH OF SPORT EXPERIENCE ON INITIAL PRACTICE OF A COMPLEX PERCEPTUAL MOTOR SOCCER TASK FOR 4-9 YEAR OLD CHILDREN.

## PROCEDURES

THE SUBJECTS WERE FORTY-SIX 4-9 YEAR OLD CHILDREN: (A) WHO WERE ENROLLED IN THE DAY CAMP AT A LOCAL COMMUNITY CENTER, (B) WHO WERE INFORMED OF THE PURPOSE AND GAVE THEIR CONSENT, AND (C) WHOSE PARENTS WERE INFORMED OF THE PURPOSE OF THE PROJECT AND GAVE THEIR CONSENT FOR THEIR CHILD TO PARTICIPATE. PARENTS COMPLETED A QUESTIONNAIRE REGARDING THE AGE OF THE CHILD AND THE CHILD'S SPORT EXPERIENCE. FAMILIES OF THE CHILDREN IN THE STUDY WERE ALL IN HIGH MIDDLE OR HIGH SOCIOECONOMIC INCOME CATEGORIES.

ALL DATA WERE COLLECTED WITHIN A FIVE WEEK TIME PERIOD AT THE LOCAL COMMUNITY CENTER. ALL DATA WERE COLLECTED ON A CAREFULLY SCHEDULED BASIS BY EXPERIENCED ADMINISTRATORS.

EACH SUBJECT PERFORMED 10 TRIALS OF THE SOCCER SKILLS TASK AND EACH TRIAL WAS VIDEO TAPED FOR EVALUATION AT A LATER TIME. THE TASK (BEITEL, 1978) INVOLVED MOVING ONES SELF THROUGH A STATIONARY ENVIRONMENT WHILE CONTROLLING AND INTERACTING WITH A MOVING SOCCER BALL; IT NECESSITATED DRIBBLING THE BALL AROUND AN OBSTACLE, AND PASSING THE BALL TO AND RECEIVING THE BALL FROM A TARGET. THE SUBJECT WAS ASKED TO COMPLETE THE TASK AS QUICKLY AS POSSIBLE. THREE TYPES OF INFORMATION WERE OBTAINED FROM WHICH TO EVALUATE EACH PERFORMANCE TRIAL:

1. PERFORMANCE TIME—THE TIME FROM INITIATION OF MOVEMENT BY THE SUBJECT UNTIL THE FINISH LINE WAS CROSSED AS RECORDED ON A PERFORMANCE ANALYZER;
2. MOVEMENT ACCURACY—THE NUMBER OF CORRECT RESPONSES OUT OF 17 AS OBTAINED FROM THE EVALUATION OF THE VIDEO TAPE OF

THE TRIAL UTILIZING THE FORM WHICH CONCERNED THE MOVEMENT OF THE PERFORMER;

3. GOAL ATTAINMENT—THE NUMBER OF CORRECT RESPONSES OUT OF 17 AS OBTAINED FROM THE EVALUATION OF THE VIDEO TAPE OF THE TRIAL UTILZING THE GOAL ATTAINMENT FORM WHICH CONCERNED THE MOVEMENT OF THE BALL IN RELATION TO THE FIXED ENVIRONMENT AND THE PERFORMER.

# RESULTS

RESULTS OF THE REGRESSION ANALYSES AND UTILITY INDEX COMPUTATIONS PRODUCED SIGNIFICANT RELATIONSHIPS OF AGE WITH:

| VARIABLE | R | $R^2$ /UI | P |
|---|---|---|---|
| BLOCK 1 PERF TIME | -.45 | 20% | .0068 |
| TRANSFER PERF TIME | -.57 | 32% | .0001 |
| TRANSFER MVT ACCURACY | .40 | 16% | .0065 |
| TRANSFER GOAL ATTAIN | .31 | 9% | .0316 |
| EXPERIENCE | | 16% | .0141 |

PLANNED CONTRASTS OF THE SEX BY EXPERIENCE INTERACTION (FIG. 1) PRODUCED ONE SIGNIFICANT RESULT, EXPERIENCED FEMALES WERE SIGNIFICANTLY OLDER THAN THE INEXPERIENCED MALES ($P = .030$). NO OTHER CONSTRUCTS WERE SIGNIFICANTLY RELATED TO AGE, I.E., ($P > .05$).

IN ORDER TO EVALUATE THE POTENTIAL OF A SPEED-ACCURACY TRADEOFF, TWO PAIRS OF CORRELATIONS WERE CALCULATED. THERE WERE SIGNIFICANT RELATIONSHIPS BETWEEN GOAL ATTAINMENT AND PERFORMANCE TIME FOR BOTH THE TRANSFER TRIAL ($R = -.65$, $P = .0001$) AND BLOCK 1 ($R = -.57$, $P = .0004$). THUS, THERE WAS A SPEED-ACCURACY TRADEOFF.

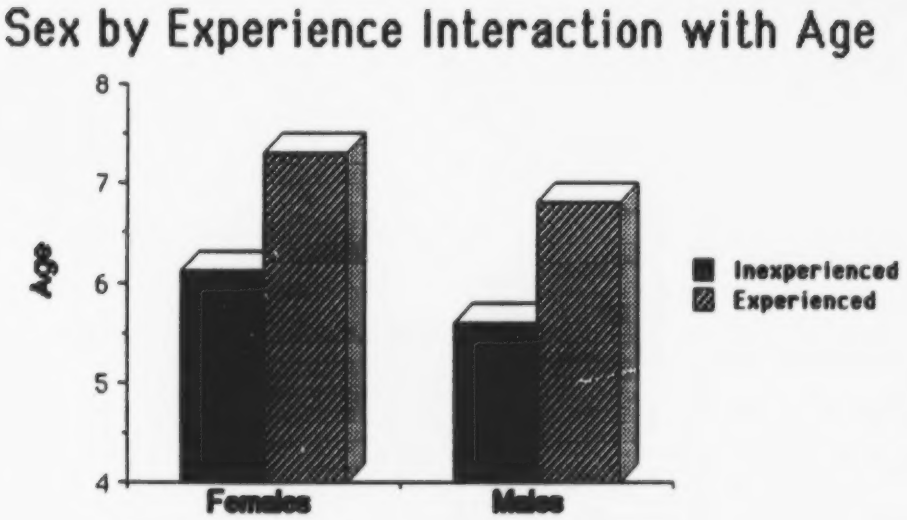


Fig. 1 Ex M and Ex F older than Inex M

MULTIPLE ANALYSES OF THE TRANSFER TRIAL SCORES FOR PERFORMANCE TIME, MOVEMENT ACCURACY, AND GOAL ATTAINMENT PRODUCED: (A) SIGNIFICANT CORRELATIONS BETWEEN ALL THE FOLLOWING PAIRS OF VARIABLES,

| VARIABLES | R | P |
|---|---|---|
| PTIME/GA | -.65 | .0001 |
| PTIME/MVTAC | -.59 | .0001 |
| GA/MVTAC | .65 | .0001 |

AND (B) A SIGNIFICANT MAIN EFFECT EXPERIENCE ($F = 4.94$, $P = .005$) IN THE SEX BY EXPERIENCE MANOVA (FIG. 2, 3, & 4). ALL THREE UNIVARIATE ANOVA'S PRODUCED A SIGNIFICANT MAIN EFFECT EXPERIENCE, WITH EXPERIENCED SUBJECTS BEING BETTER THAN INEXPERIENCED SUBJECTS FOR: (A) PERFORMANCE TIME ($P = .0005$, FIG. 2) WHICH ACCOUNTED FOR 27% OF THE VARIABILITY IN THE MODEL; (B) MOVEMENT ACCURACY ($P = .0036$, FIG. 3) WHICH ACCOUNTED FOR 18% OF THE VARIABILITY IN THE MODEL; AND (C) GOAL ATTAINMENT ($P = .0250$, FIG. 4) WHICH ACCOUNTED FOR 13% OF THE VARIABILITY IN THE MODEL.

SUBSEQUENT PLANNED COMPARISONS WERE CALCULATED FOR THE SEX BY EXPERIENCE INTERACTION FOR EACH OF THE TRANSFER VARIABLES. FOR PERFORMANCE TIME (FIG. 2): (A) EXPERIENCED FEMALES WERE FASTER THAN INEXPERIENCED MALES ($P = .0097$); AND (B) EXPERIENCED MALES WERE FASTER THAN INEXPERIENCED MALES ($P = .0013$) AND INEXPERIENCED FEMALES ($P = .0022$).

FOR MOVEMENT ACCURACY (FIG. 3), EXPERIENCED MALES AND FEMALES HAD MORE ACCURATE MOVEMENT THAN INXPERIENCED FEMALES ($P = .0008$). FOR GOAL ATTAINMENT (FIG. 4), EXPERIENCED MALES AND FEMALES WERE MORE SUCCESSFUL

IN GOAL ATTAINMENT THAN INEXPERIENCED FEMALES ($\underline{P}$ = .0433).

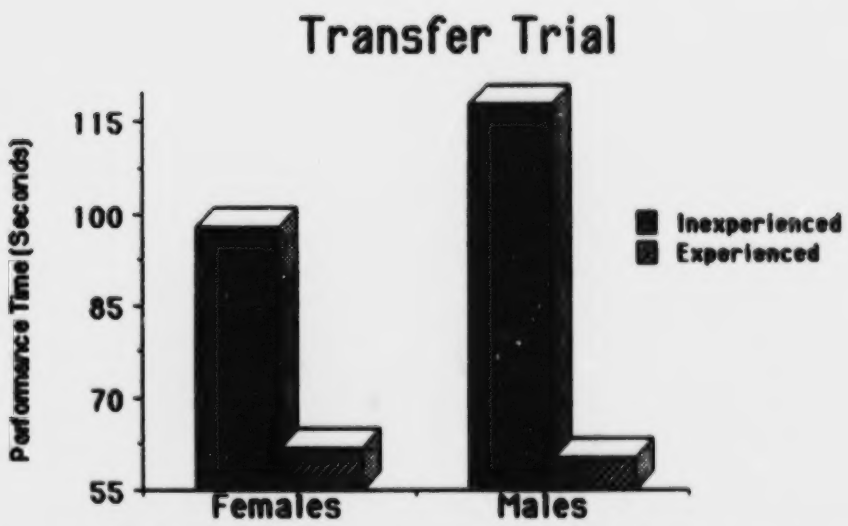


Fig. 2 Ex M and Ex F faster than Inex M; Ex M faster than Inex F

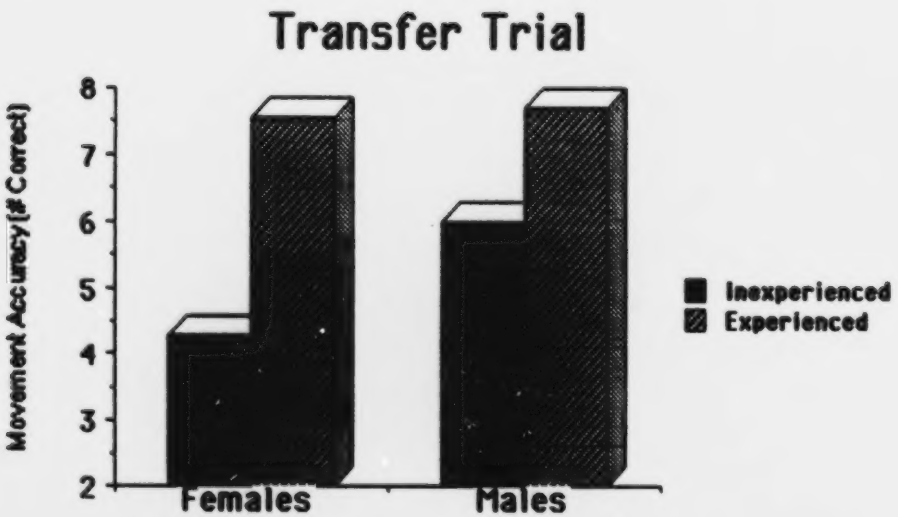


Fig. 3 Ex M and Ex F more accurate than Inex F

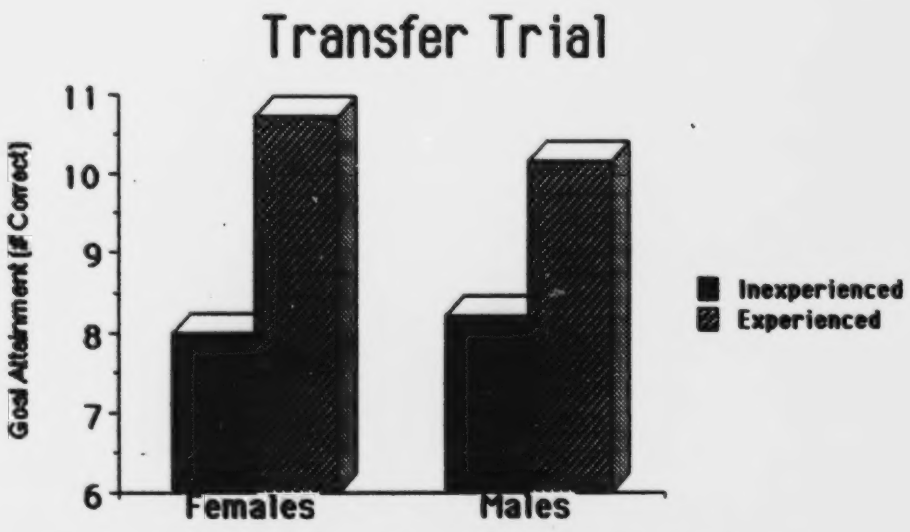


Fig. 4 Ex M and Ex F better goal attainment than Inex F

MULTIPLE ANALYSES FOR THE BLOCK 1 SCORES FOR PERFORMANCE TIME, MOVEMENT ACCURACY, AND GOAL ATTAINMENT PRODUCED: (A) SIGNIFICANT CORRELATIONS BETWEEN ALL THE FOLLOWING PAIRS OF VARIABLES,

| VARIABLE | R | P |
|---|---|---|
| PTIME/GA | -.57 | .0004 |
| PTIME/MVTACC | -.65 | .0001 |
| GA/MVTACC | .74 | .0001 |

AND (B) A SIGNIFICANT MAIN EFFECT EXPERIENCE ($F$ = 3.6042, $P$ = .0256) IN THE SEX BY EXPERIENCE MANAVOA (FIG. 5, 6, & 7). THE UNIVARIATE ANOVA'S PRODUCED THE FOLLOWING SIGNIFICANT MAIN EFFECTS: (A) FOR PERFORMANCE TIME, AN EXPERIENCE EFFECT ($P$ = .0041) WHICH ACCOUNTED FOR 22% OF THE VARIABILITY IN THE MODEL, WITH EXPERIENCED SUBJECTS PERFORMING FASTER THAN INEXPERIENCED SUBJECTS; AND A SEX EFFECT ($P$ = .0185) WHICH ACCOUNTED FOR 15% OF THE VARIANCE IN THE MODEL, WITH MALES PERFORMING FASTER THAN FEMALES (FIG. 5); AND (B) FOR GOAL ATTAINMENT, AN EXPERIENCE EFFECT ($P$ = .0341) WHICH ACCOUNTED FOR 15% OF THE VARIABILITY IN THE MODEL, WITH EXPERIENCED SUBJECTS BEING MORE SUCCESSFUL IN GOAL ATTAINMENT THAN INEXPERIENCED SUBJECTS (FIG. 7).

SUBSEQUENT PLANNED COMPARISONS WERE CALCULATED FOR THE SEX BY EXPERIENCE INTERACTION FOR EACH OF THE BLOCK 1 VARIABLES. FOR PERFORMANCE TIME, EXPERIENCED MALES ($P$ = .0005) AND EXPERIENCED FEMALES ($P$ = .0125) PERFORMED SIGNIFICANTLY FASTER THAN INEXPERIENCED FEMALES (FIG. 5). FOR MOVEMENT ACCURACY, EXPERIENCED MALES, EXPERIENCED FEMALES, AND INEXPERIENCED MALES HAD SIGNIFICANTLY ($P$ = .0078) MORE ACCURATE MOVEMENT THAN INEXPERIENCED FEMALES (FIG. 6). FOR GOAL ATTAINMENT, EXPERIENCED MALES AND FEMALES WERE SIGNIFICANTLY

($\underline{P}$ = .0134) MORE SUCCESSFUL IN GOAL ATTAINMENT THAN INEXPERIENCED FEMALES (FIG. 7).

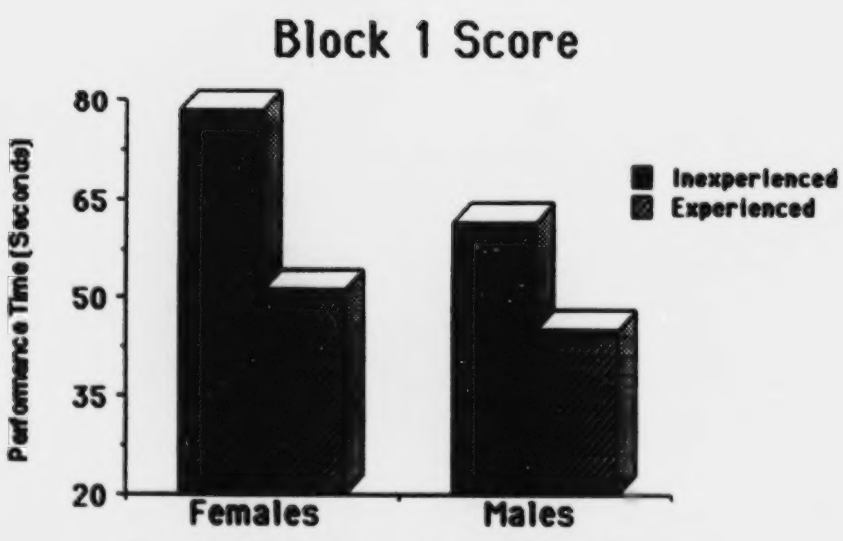


Fig. 5 Ex M and Ex F faster than Inex F

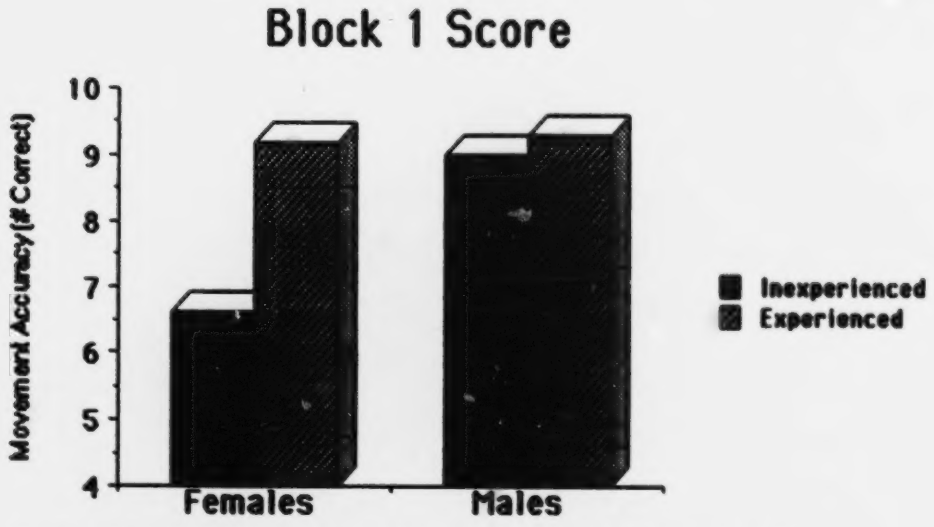


Fig. 6 Ex M, Ex F, and Inex M more accurate than Inex F

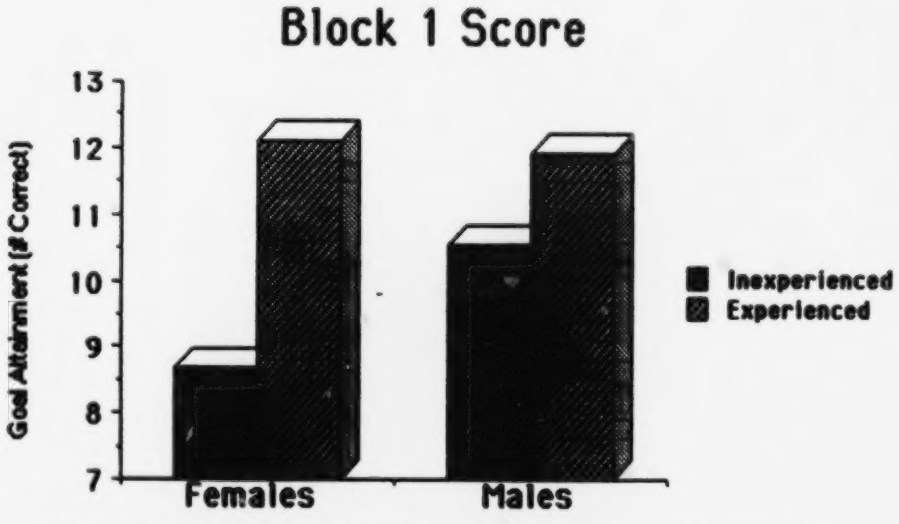


Fig. 7 Ex M and Ex F better goal attainment than Inex F

THERE WERE NO SIGNIFICANT ($p$ > .05) MULTIVARIATE OR UNIVARIATE MAIN OR INTERACTION EFFECTS FOR THE SEX BY EXPERIENCE MODEL ON CONSISTENCY OF BLOCK 1: (A) PERFORMANCE TIME (FIG. 8), (B) MOVMENT ACCURACY (FIG. 9), AND (C) GOAL ATTAINMENT (FIG. 10). NEITHER WERE THERE ANY SIGNIFICANT ($p$ > .05) CORRELATIONS BETWEEN ANY PAIRS OF THESE THREE VARIABLES.

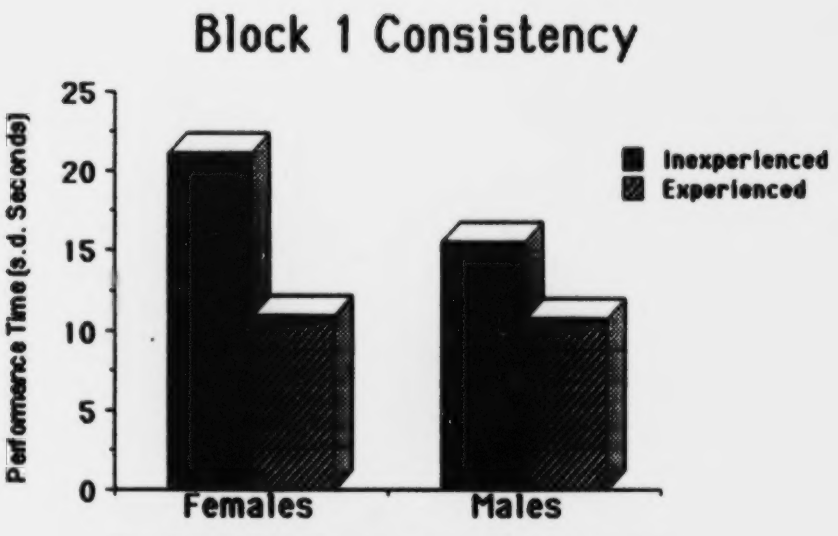


Fig. 8 No Significant Interactions $p > .05$

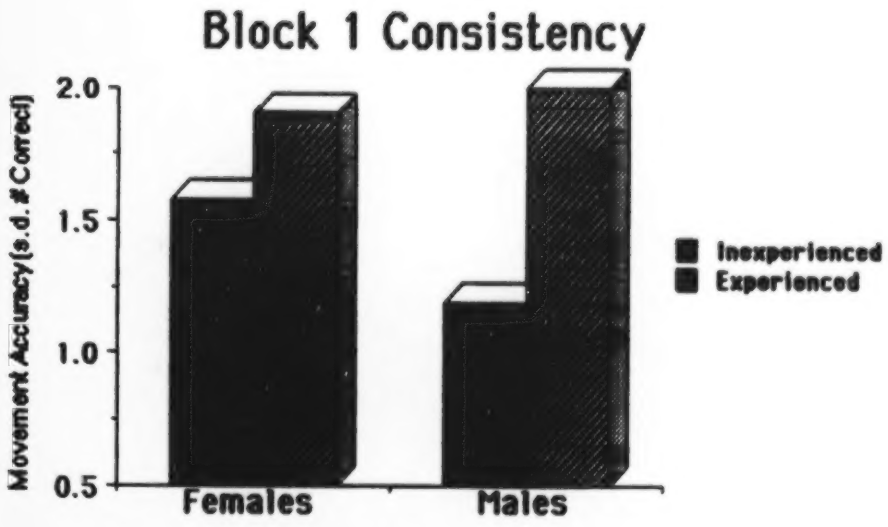


Fig. 9 No Significant Differences $p > .05$

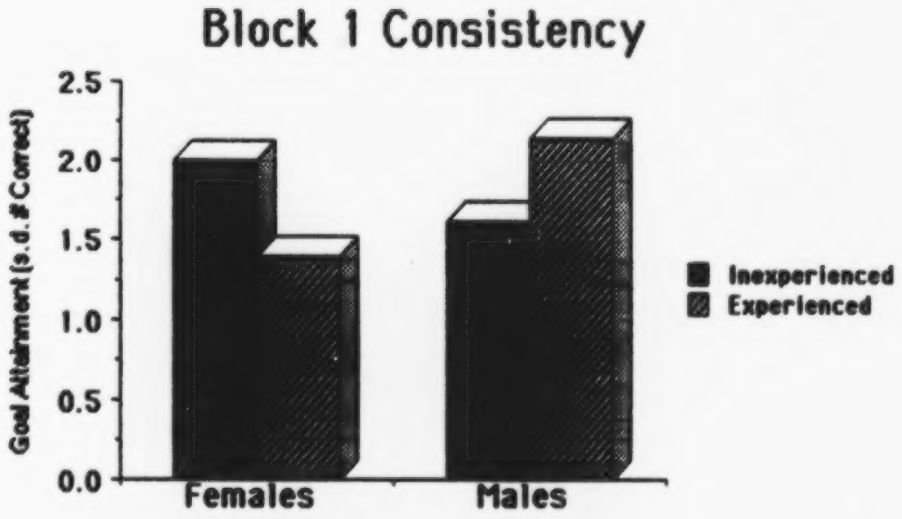


Fig. 10 No Significant Differences $p > .05$

BASED ON THE EXPERIENCE BY SEX CONTRAST OF UTILITY INDICES (FIG. 11), EXPERIENCE ACCOUNTED FOR MORE VARIABILITY THAN SEX IN EACH MODEL FOR ALL VARIABLES EXCEPT: (A) BLOCK 1 MOVEMENT ACCURACY, AND (B) CONSISTENCY OF GOAL ATTAINMENT.

## Experience by Sex Contrast of Utility Indices

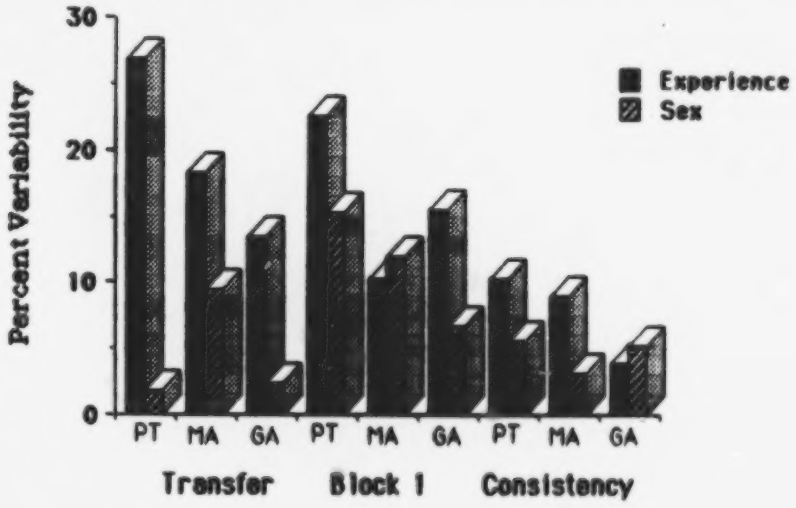


Fig. 11

# CONCLUSIONS

BASED ON THE RESULTS, THE FOLLOWING CONCLUSIONS HAVE BEEN DRAWN.

1. THERE WAS A SPEED-ACCURACY TRADEOFF IDENTIFIED BY SIGNIFICANT RELATIONSHIPS OF BOTH TRANSFER AND BLOCK 1 GOAL ATTAINMENT AND PERFORMANCE TIME.
2. THERE WAS A MODERATE AGE RELATIONSHIP TO TRANSFER TRIAL GOAL ATTAINMENT, MOVMENT ACCURACY, AND PERFORMANCE TIME.
3. THERE WAS A MODERATE RELATIONSHIP OF AGE TO BLOCK 1 PERFORMANCE TIME, BUT NOT TO BLOCK 1 GOAL ATTAINMENT NOR MOVEMENT ACCURACY.
4. EXPERIENCE WAS MORE RELATED THAN SEX TO ALL VARIABLES EXCEPT BLOCK 1 MOVEMENT ACCURACY AND CONSISTENCY OF GOAL ATTAINMENT.
5. EXPERIENCED MALES AND FEMALES AND INEXPERIENCED MALES WERE SIMILAR IN MOVEMENT ACCURACY.
6. EXPERIENCED FEMALES AND MALES WERE MORE SUCCESSFUL IN GOAL ATTAINMENT THAN INEXPERIENCED FEMALES.
7. EXPERIENCED MALES AND FEMALES WERE FASTER THAN INEXPERIENCED MALES FOR THE TRANSFER TRIAL; BUT, FOR BLOCK 1, EXPERIENCED MALES AND FEMALES WERE FASTER THAN INEXPERIENCED FEMALES.
8. THE EXPERIENCED MALES AND FEMALES APPEARED TO BE INTEGRATING THE SPEED AND ACCURACY COMPONENTS OF THE TASK TO THE GREATEST EXTENT BETWEEN THE TRANSFER TRIAL AND BLOCK 1.

THUS, THE PRIMARY CONTRIBUTIONS OF THE STUDY ARE THAT: (A) AGE AND EXPERIENCE ARE MOST IMPORTANT TO THE QUALITY OF PERFORMANCE, AND (B) THERE WERE NO CONSTRUCTS RELATED TO CONSISTENCY FOR THIS AGE GROUP. THEREFORE, EXPERIENCE SUGGESTS A NEGATION OF GENDER EFFECTS IN CHILDREN FOR THE INITIAL PERFORMANCE OF COMPLEX PERCEPTUAL MOTOR TASKS.